Final Project Report to the NYS IPM Program, Agricultural IPM 2000 – 2001

Title: Continued examination of organic fertilizers/microbial products and their possible role in disease suppression on golf course turfgrass in the Capital District of New York State

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Microbials

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Nationally

Abstract:
Interest in developing alternatives to chemical fungicides for the control of turfgrass diseases exists among many members of the turfgrass community, including golf course superintendents, university and Extension educators, legislators and environmental activists. While many organic fertilizers/microbial products claim to supress disease, and laboratory trials have been substantiated some of these claims, very few in-the-field studies exist comparing these types of products. This project examined several organic fertilizers/microbial products for supression of the disease dollar spot (Sclerotinia homoeocarpa) . Unfortunately, weather conditions did not allow for sufficient disease development, and little data was generated. New protocols for conducting this type of field research are needed to efficiently study disease supression in a meaningful manner.

Background and justification:
While most New York State golf course superintendents rely on chemical fungicides to control turfgrass diseases, the exclusive use of chemical fungicides for disease management is becoming increasingly problematic. Some members of the public harbor an increasingly negative

perception of pesticides. Federal, state, and local governments are enacting legislation to restrict or discontinue the use of pesticides in some jurisdictions. Interest in alternatives to chemical fungicides is increasing, with composts, single and complex combinations of microbes, and various organic compounds being examined for disease suppression possibilities. Microbes that have shown disease suppression capability include *Trichoderma harzianum*, *Rhizobium spp*., and *Bacillus spp*. In most studies, disease suppression has been demonstrated most effectively under laboratory conditions. Few side-by-side evaluations of these products have been conducted in the field, making it impossible to evaluate the disease suppression capabilities of one product compared to another.

In 1998 and 1999, twelve of these products were examined at a Capital District golf course to evaluate their role in disease suppression. While the results did not clearly indicate the effectiveness of these products, trends of suppression were shown in the data collected. Similar studies undertaken by Dr. Eric Nelson at Cornell University in Ithaca in 2000. Unfortunately, no study to date has replicated the good control seen in some labs out in the field. An important factor that has not been fully examined is the influence of the volume of water in which these products are applied. At current manufacturer's recommended rates, the volume of product (and the water carrier) applied per area is very small. A larger amount of water may provide better distribution of the same quantity of active ingredient across the turfgrass foliage, crowns, and thatch surface, thereby increasing disease suppression potential.

Objectives:

1. To examine the influence that the volume of carrier (water) has on the disease suppression ability of four microbial turfgrass products.

2. To continue to examine new products for disease suppression ability.

Procedures:

The study was conducted at the Troy Country Club in Troy (Rensselaer County), NY. In consultation with the golf course superintendent, areas for the study were chosen on two fairways (#4 and #12). Using a randomized design, product and check plots were constructed on the fairways. Each plot measured 5 ft by 5 ft. (25-sq. ft.). Three replications of each treatment were made on each fairway.

The products which had previously shown the most potential for disease suppression in the studies conducted in the Capital District and in Ithaca in the past three seasons were used in this study for the volume of carrier comparison (treatments 1 - 8). Two rates of carrier (2 gal./1,000 sq. ft. and 5 gal./1,000 sq. ft.) were used while keeping the amount of active ingredient constant. Two newer products were also included in the study (treatments 9, 10 and 11). Treatments 9 and 10 were a potassium bicarbonate product used at two different rates with the same volume of water, while treatment 11 contained the microbial *Trichoderma harzianum* strain T-22. Table 1 provides details of the treatments.

Table 1

Treatment Number	Treatment Name	Manufacturer
1	Mycostop	AgBio, Inc., Westminster, CO
2	Mycostop (2x water)	
3	Primastop	AgBio, Inc., Westminster, CO
4	Primastop (2x water)	
5	Roots 1-2-3 plus Stand-Up	Roots, Inc., Independence, MO
6	Roots 1-2-3 plus Stand-UP (2x water)	Roots, Inc.
7	Roots 1-2-3 plus AMS II	Roots, Inc., Independence, MO

8	Roots 1-2-3 plus AMS II (2x water)	Roots, Inc.
9	HM2036-10	Under development with Ken Horst
10	HM2036-12	Under development with Ken Horst
11	Turfshield	BioWorks, Inc. Geneva, NY
12	Bayleton (granular tridimefon)	Lesco, Inc., Strongswille, OH
13	Check	

Applications were made once per week starting at approximately 6:00 PM EST. The weekly treatments started on June 3 and continued through August 13. All plots were scouted once per week through the project duration. Soil and plant samples were to be collected for identification of fungal pathogens, or, the case of dollar spot disease (Sclerotinia homeocarpa), the number and size of spots were to be quantified.

Results and discussion:

Unfortunately, the abnormally dry 2001 growing season supressed disease development in the study plots, making it possible to collect very little data. In previous studies on these same fairways (1998, 1999), dollar spot disease was seen by June 15 each year. Many plots were so damaged by dollar spot during the ensuing weeks that individual spots could not be counted, making it necessary to instead measure the percentage of each plot damaged. This year in the Capital District, rainfall for July was over 1.5 inches below normal (3.62" vs. 1.93"), while August rainfall was an inch below normal (3.47" vs. 2.46"). As a result, dollar spot was seen on fairway 4 on only two observation dates, July 9 and July 17. By the following observation date, July 24, drought damage on fairway 4 became very prevalent, the dollar spot patches from the previous two weeks either became drought damaged or recovered, and dollar spot was no longer visible. Dollar spot was not seen again on fairway 4 for the remainder of the summer. Dollar spot was never observed on fairway 12 for the duration of the study. The golf course superintendent at Troy Country Club reported seeing very little dollar spot on the rest of the course in 2001. While dollar spot was reported on other golf courses in the lower Hudson Valley, Long Island and elsewhere, similar studies in Ithaca also reported a lack of disease development.

The difficulty in generating meaningful data in 2001 supports past concerns raised in previous studies of this type, namely, that weather conditions can "make-or-break" the study by heavily influencing whether disease develops in the test plots. Furthermore, in seasons when dollar spot does develop, there is still some question as to how uniformly the disease develops across the plots. If disease prescense is not consistent, the resulting data may seem to indicate disease suppression for some treatments when in fact the disease was simply not present in those plots. This concern is raised because, in the past, variation in disease development within the replications of one treatment was often found to be significant. Minimizing this type of variability is crucial to the success of future studies.

New protocols are therefore needed for this type of research to insure that the potential for disease development is uniform in all plots, and to encourage disease development when weather conditions may be less than ideal for it to occur naturally. This may potentially involve innoculating plots with a disease organism, or transferring diseased turfgrass plants into the plots. Hopefully, university researchers and Extension educators can work together to address this issue and continue studying the alternatives to chemical fungicides as they come on to the market.